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ANNUAL OCCURRENCE OF SPADE-FOOT TOADS.

Spade-foot toads (*Scaphiopus holbrooki*) appeared in Patchogue on the evening of May 22, 1915, for at least the fourth successive year. The first hard rain of spring occurred on the night of May 21, and on the evening of May 22, great numbers of toads were present in the same pool in which they have been seen in previous years. On the morning of the 23d nearly every blade of grass in the pool was covered with their eggs, and by night not a toad remained in sight. The sudden emergence of the toads from their underground retreats and their extremely short stay in the breeding pools, probably accounts for the former belief that years usually elapse between their appearances.

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NOTE ON AN UNUSUALLY LARGE OCEAN SUNFISH.

On May 14, 1915, I examined a very large Ocean Sunfish or Mola (*Mola mola*) at the fish house of the Borzone Fish Company in San Francisco. The fish had been caught the day before in a parancella net about 40 miles off the Golden Gate and south of the Farallons.

The following measurements and notes were taken: Total length 9 feet; width 7 ft. 9 in.; eye to snout 14 in.; diameter of orbit 5 in.; eye to base of pectoral 17 in.; length of pectoral 15 in.; width $12\frac{1}{2}$ in.; gill opening $4\frac{1}{4} \times 6\frac{1}{2}$ in.; length of dorsal (mutilated) 2 ft. 5 in.; width 23 in.; length of anal 21 in.

Color silvery; body, especially anteriorly, covered with hard, bony, silvery, stellate or granular plates.

After the fish had been caught in the net it was attacked by sharks and badly mutilated, especially on the fins and about the nose.

It was said that this fish weighed 2,500 pounds, but I cannot vouch for the truth of this statement. My own estimate was not to exceed 1,800 pounds.

This was said to be the largest fish of this species ever taken by San Francisco fishermen. Smaller examples weighing 300 to 400 pounds are occasionally taken. One was brought in in April of this year that weighed about 300 pounds. One was taken in June, 1893, off Redondo Beach, California, that measured 8 ft. 2 in., and weighed 1,800 pounds.

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[The mounted skin of a *Mola* 10 ft 2 in. in total length from Long Beach, California, May, 1911, is exhibited in the American Museum of Natural History, New York.—*Ed.*]

HIBERNATION OF REPTILES.

A friend in Bridgeport, Connecticut, is my authority for the statement that there seems to be a great difference in animals, as to their tendency to hibernate in winter, and the effect of temperature upon the physical phases of their life. He had had for three years, in 1910, a brace of rattle-snakes,

(*Crotalus horridus*) from the neighborhood which he kept in a glass case, and maintained a summer temperature the year round, with the result that during that period of three years the snakes did not hibernate, but maintained an active existence during the entire time. He has observed that they have shed their epidermis at shorter periods than has been generally supposed; to wit, about once in three months, and that this is not a constant factor, but will vary. It has popularly been held as an indisputable fact that the rattle-snake adds one joint to the rattle each year, but Mr. Ford has discovered that a new joint is added to the rattle with each shedding of the epidermis, and the snakes in his collection have added from three to four buttons each year, proving that the old time hypothesis is erroneous. The snakes have fine rattles with perhaps ten or twelve buttons and have attained a length of maybe less than twenty inches. In this collection, under the scrutiny of Mr. Ford, is a small mud turtle (species unknown) that is kept at about the same temperature as the snakes but with different results. As winter approaches and the proper season arrives it declines to eat, draws in its head and becomes lethargic and finally falls into a stupor, which lasts till spring when it awakes again to its wonted life and activity. From these facts, it would be interesting to determine what degree of cold a dormant animal may be subjected to without destroying its latent vitality, and what degree of temperature is necessary to induce hibernation in any given animal.

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ON ONE OR TWO COMMON STRUCTURAL ADAPTATIONS IN FISHES.

The caudal fin of fishes is the chief propelling organ. As such its form is a good criterion of a fish's

habit of locomotion. The forked form is used almost without exception by those species which swim continually through extensive stretches of open water. The water slipping along the fishes flanks must escape backward in the middle line of its tail. Side to side motion of a square caudal would interfere with the backward flow of the water and impede the fish. Obviously the forked fin is better adapted for this work as the central impeding portion is eliminated and the lobes brace against comparatively stationary water. A narrow peduncle is also an advantage and we find the peduncle tending to be more and more narrow particularly in its vertical diameter, and it is often strengthened by keels in its horizontal diameter, that is the plane of its motion. It is interesting that the same type is approached by the mackerels, a free swimming more or less pelagic off-shoot of the Percoid stem, by the mackerel-sharks, most active swimmers of the sharks, which have a very different heterocerical caudal as a basis of variation, and the Cetacea, among mammals. The Cetacea are, interestingly enough, adapted to motion in a different plane, moving their forked caudal up and down instead of from side to side, and with the peduncles narrowed horizontally instead of vertically.

Certain fishes, except when alarmed, propel themselves not by the caudal, but by the breast-fins. Such are the wrasse-parrotfish group, which slip in and out among rocks and the crevices of coral-reefs. These have usually squarish or rounded caudals, quite different from the firm forked ones of more actively free-swimming fishes. Indeed the relative forking is a fair criterion of the amount of swimming that a fish does, the minnows with forked caudals, being more active swimmers than the killifish group with rounded, the sea running salmon having a more forked caudal than the brook inhabiting trout, the old trout a squarer tail than the young, to whom the

same brook furnishes, compared to its size, a wider swimming range.

The evolution in habit and structure which from a group of predaceous free-swimming mammals like the Delphinidae has evolved the large whale-bone whales which feed on small animals sifted from the water with their baleen, is more or less paralleled in several independent groups of fishes. Our common menhaden, representative of the herrings, is a good example. Though a small fish the size and density of the schools in which it swims are in a way analogous with the cetacean's bulk. Continually it swims forward, its mouth wide open, gulping sea-water from which its very fine lengthened gill-rakers are sifting food enough to make it very fat and sought after for its oil. A better example are the gigantic basking shark and whale shark, off-shoots from the active predaceous mackerel sharks. The large gill openings and very small teeth of these largest of fishes, show them to be sifters of small food. In the almost universally predaceous mackerel genus *Scomber* an East Indian species has very long fine gill-rakers, doubtless associated with herring-like feeding habits.

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CONCLUDING NOTES ON THE SALIENTIA OF JACKSONVILLE, FLA.

Acris gryllus, Le Conte, the "Cricket frog," is one of the commonest frogs, great swarms of this species having been seen by the writer during the spring months about the edges of bayous, creeks and ponds. Its rattling notes can be heard during the entire warm season, day and night. Owing to the small size of its adhesive disks, this tree-"frog" cannot climb into trees, but lives on the ground, wandering into fields, meadows and gardens. It attains a length of $1\frac{1}{4}$ inches from snout to vent, but the

greater number of specimens are 1 inch or less in length. This species looks and acts more like a water frog than a tree-toad, although belonging to the latter family.

Chorophilus occidentalis, B. & G., is a beautiful species, rarely seen except in early spring. At this time, however, it occurs in great numbers in the large, shallow bayous, where it stands almost straight upright, on some twigs or weeds, with its large throat pouch distended, giving vent to its piercing call. This call is very loud, similar in pitch to that of *Hyla pickeringi*, but much shorter, and at a distance sounds like the ring of a steel chisel, when struck by a hammer.

This is the largest species of the genus *Chorophilus*, attaining a length of 1½ inches, from snout to vent. It is stout of body, the head is pointed, the arms and legs rather short and stout. The toes are very slightly webbed, the disks on fingers and toes scarcely noticeable. The subarticular tubercles are very prominent.

The structure of this species indicates terrestrial, possibly subterranean habits. I have dug specimens out of the sweet-potato hills in my garden.

The smooth, shiny upper surfaces are rich reddish brown or fawn colored, like specimens of our northern Wood frog. There is a black band on each side, beginning at the nostril, running through the eye, over the tympanum to the shoulder. The edge of the upper jaw is silvery white. The groin is rich yellow or orange, with large elongate or round black spots. The undersides are white, faintly spotted with brown on the throat, flesh colored posteriorly. On the back there may be two broad, dark brown parallel bands. The arms and legs are banded more or less distinctly with brown.

Chorophilus nigratus, Le Conte, or "Swamp Tree-toad," is found during the Winter and early Spring, in great numbers about ditches and bayous.

Its call is similar to that of the Cricket "frog," but much louder, and the crepitations are slower. It is a shy species, extremely difficult to catch. The color is gray or greenish-black, with usually three longitudinal rows of black, light-edged, roundish spots. Occasionally these spots fuse into bands. The limbs are also spotted. On the upper jaw there is a pale yellowish line, extending to the arm insertion. A narrow black band starts at the tip of the snout, runs through the eye, covers the tympanum and ends at the shoulder or beyond. The undersurfaces are greenish yellow. The back and outer parts of the limbs are covered with large round warts, giving the creature a very rough appearance. The belly is coarsely granulated. The tips of the fingers and toes have small disks. The foot is slightly webbed. The head is even more pointed, and much narrower, than in the preceding species.

Chorophilus ocularis, Holbrook. This is the smallest of the North American frogs, rarely exceeding $\frac{5}{8}$ inch from snout to vent. The head is pointed, the eyes large, the limbs and body slender. The disks on the fingers and toes are small but distinct. The skin of the back is covered with very fine warts, that of the belly finely granulated. The color is yellow, reddish brown or chestnut. The upper jaw is margined with white. There are three longitudinal dark brown dorsal bands, one from the tip of the snout to above the vent, usually bifurcate posteriorly, and one on each side of this, starting behind the eye. Underneath, it is pale yellow. The male's throat is dark brown, and can be distended to the size of a large pea. The arms and legs are indistinctly cross-banded.

These small "frogs" are very numerous near Jacksonville, but owing to their small size, are seldom seen. During the Spring months, they abound on the marginal vegetation of the "bayous," the males giving

vent to their faint calls, which sound more like the chirping of insects than the calls of frogs.

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ON A YOUNG BLACK ANGEL FISH.

A *Pomacanthus arcuatus*, 3 or 4 inches long, taken near San Antonio Bridge, Porto Rico, last July, in a biological survey of that island which is being forwarded by the N. Y. Academy of Sciences and the Insular Government, had bright yellow, instead of whitish, cross bands. Yellow bands are then, not diagnostic of *paru*, perhaps they are ordinarily yellow in sufficiently small *arcuatus*.

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